Evolution of Process Control Networks within the Unified TPS/Experion Control Environment

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Honeywell Evolution Vision

• Keep your reliable system running longer with different modernization options
• Protect intellectual property and capital investments
• Provide services support for upgrade to the new technology

Delivering continuous evolution for 40+ years

Committed to Protecting Your Automation Investments
## TPN/TPS Evolution to Experion PKS

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1975</td>
<td>TDC 2000</td>
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<td>1983</td>
<td>TDC 3000 Universal Station</td>
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<tr>
<td>1988</td>
<td>Process Manager</td>
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<tr>
<td>1996</td>
<td>FSC integrated in TPS / TPN</td>
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<td>2004</td>
<td>Experion Station TPS</td>
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<td>2007</td>
<td>C300 and SM integrated in Experion PKS</td>
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<tr>
<td>2010</td>
<td>Unified HMI using Experion PKS</td>
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<tr>
<td>2013</td>
<td>Unified TPS/EPKS Control Environment</td>
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**Classic Technology**

**21st Century Technology**
TPS Merges into Experion

Fault-Tolerant Ethernet

Experion Station

EHPM

C300

Safety Manager

Vision

TPS Components Gradually Melt into Experion
Unified Control Environment Benefits

**Sustainability**
- Keeps your plant running longer
- Protects your Intellectual property (IP)
- Protects your CAPEX investments
- Utilize skills / resources

**Process Expansion Efficiency**
- Expansions with controllers of choice
- Replication of Control functions
- Replication of applications and HMI

**Maintenance Efficiency**
- Better diagnostics
- Reduced maintenance
- Skilled labor availability

Support Longevity and Improved Plant Performance

**Maintenance Efficiency**
Maintenance cost reduction >5% with modernization

Up to 50% reduction in engineering cost

IP, CAPEX life extension to 2035
# Simplification of Controllers Modernization

## Key Customer requirements
- Reduce / eliminate production downtime
- Units turnaround schedule independency
- Short changeover time for modernization
- Minimized engineering effort
- Minimized upgrade/expansion risks

## The Honeywell approach
- On-process infrastructure setup – hybrid UCN
- On-process HPM to EHPM upgrades
- Step-wise incremental UCN modernization
- No changes in control and applications
- No changes in displays
- Retention of peer-to-peer communication between coax and FTE based devices on the hybrid UCN

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**The Best Control Network Modernization We Have Ever Made**
TPN/EPKS Control Networks as of Today

Expansions and One-Time UCN Upgrade Solution

EHPM Solutions Program
TPN685.3; EPKS R431.1
Preparation for Modernization

FTE infrastructure engineering and setup

• FTE cable installation
• Level 2 switch installation
• CF9 firewalls Installation
Step 1: Setup Hybrid UCN (NIM to ENB upgrade)

Reduced Downtime by On-Process NIM-ENB Upgrades

OPM & step-wise upgrades using ENB

2Q2016 – ENB (Enhanced Network Bridge)
TPN686.1; EPKS R432.1
On-process Upgrade Steps: NIM to ENB

- Create a back-up – checkpoint
- Power down – secondary NIM
- Upgrade the hardware
  - Select 3 slot position
  - Setup FTE index, UCN address
  - Connect FTE cables
- Power-up/Load secondary
- Power down – primary NIM
- Upgrade the hardware
- Power-up/Load primary
- Upgrade - completed
Primary NIM to ENB Upgrade

Front View

ENIM node 17 - EUCN 4

ENB node 30 – (E)UCN 10

Rear View

EUCN 10
FTE

ENIM node 17
EUCN 4

ENB node 30
(E)UCN 10

UCN 10
coax
On-process Upgrade Steps: HPM to EHPM

- Create a back-up – checkpoint
- Power down – secondary HPM
- Upgrade the hardware
  - Setup FTE index, UCN address
  - Replace hardware
  - Connect FTE cables
- Power-up/Load secondary
- Power down – primary HPM
- Upgrade the hardware
- Power-up/Load primary
- Upgrade - completed
Step 3: Upgrade FSC Controllers to SM on EUCN

FSC to SM upgrade
3Q2016 - Off-Process Upgrade SM R160.2
TUV approved migration tools

No Application Changes for FSC - SM on EUCN Upgrades
Upgrade steps: FSC to SM on EUCN

- Create a back-up – checkpoint
- Upgrade FSC software to R800
- Transition FSC software to SM
- Power down the cabinet
- Execute hardware changes
  - Replace card files
  - Install SM Central Parts
  - Connect FTE cables
- Power-up SM
- Install applications
- Reload Checkpoint
- Upgrade - completed
Step 4: Triconex-SMM to Triconex-TCMI on EUCN Upgrade

Triconex-SMM to Triconex-TCMI upgrade
2017 - Off-Process Upgrade TPN R687

No Safety Application Changes
Upgrade steps: Triconex-SMM to Triconex-TCMI

- Create a back-up – checkpoint
- Upgrade Triconex to V10
- Install Honeywell TCMI
- Power down Triconex
- Execute hardware changes
  - Install TCM card
  - Connect TCM-TCMI cables
- Power-up Triconex system
- Execute Triconex changes for TCM
- Power up TCMI and Checkpoint load
- Upgrade - completed
Step 5: LM/IPC620 to ELMM/C300 on EUCN Upgrade

LM/IPC 620 to ELMM/C300 upgrade
2015 – Released - Off-Process Upgrade TPN R685.3
EPKS R410.1

Low- Risk and Minimum-Downtime Upgrade for LM
Upgrade steps: LM/IPC 620 to ELMM/C300

- **Execute Engineering Activities (Offline activity)**
  - Build C300 control strategies from IPC 620 Ladder logic using the LM – C300 conversion tool
- **Create Checkpoint - LMM and backup all the IPC data**
- **Shutdown IPC, LMM and LCS IOMs**
- **Execute Hardware Changes**
  - Remove LM, LCS IOMs and mount C300, ELMM
  - Connect CF9 with ELMM to L2 switch having the ENIM
  - Make all necessary power and switch connections
  - Follow standard C300 power on procedures
- **Load ELMM with TPN R685.3 or later personality**
- **Restore LMM checkpoint on ELMM**
- **Load C300 controller and Series C / PM IO**
- **Upgrade completed**
Step 6: Transfer ENB to ENIM

ENB to ENIM transfer
Disconnected coax UCN cables

Step-Wise Control Network Upgrade Completion
On-process ENB to ENIM Changeover

- Create a back-up – checkpoint
- Power down secondary ENB
- Disconnect UCN coax cable
- Remove EPNI and EPNI IO boards
- Power-up/load secondary – ENB becomes ENIM
- Power down primary ENB
- Disconnect UCN coax cable
- Remove EPNI and EPNI IO boards
- Power-up/load Primary – ENB becomes ENIM
- Changeover - completed
Additional Benefits from Simplified Migration

**Production Downtime**
- On-Process initial setup
- On-Process HPM to EHPM upgrade
- On-Process change to the final setup

Reduce up to 30% of production downtime for migration activities

**Automation Planning**
- Investment linearity
- Step-wise incremental upgrades
- On-process changes
- Changes during shutdown

Up to 80% automation planning accuracy improvement

**Modernization Investment**
- No changes in control, applications, HMI
- Independence from ageing workforce knowledge
- Minimal engineering / training requirements

Total upgrade investment reduction larger than 25%

Reduced Risk and Investments Savings
Information for Customers

TPS/TDC to Experion PKS Control Unification – EHPM Solutions

Honeywell offers the Enhanced High Performance Process Manager (EHPM) solution that marks a significant advancement in extending the lifespan of TPS/TDC systems due to its easy and cost-effective integration with Experion® PKS. By maintaining the wiring, HMI and controls and thus preserving intellectual property, EHPM reduces risk and downtime for users.

What Is It?

Integrated Control for TPS/TDC and Experion PKS

Enhanced High Performance Process Manager (EHPM) represents the ongoing evolution of the TPS/TDC system to the advanced technology of Experion PKS and is built upon the industry’s most widely used and reliable controller, High Performance Process Manager (HPPM). It allows users to avoid rip-and-replace upgrades, which can be more expensive and less secure than phased modernization techniques.

As part of the first modernization phase, the following features will become available to users through 2014:

- Infrastructure with EHPM connected to the FTE-based Enhanced Universal Control Network (EUCN)
- Control function enhancements with control-level data exchange between EHPM and C300 controller
- Safety function enhancements with data exchange between EHPM and Safety Manager across EUCN, and modernization of the Fail Safe Controller (FSC) functions to Safety Manager.

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